To calculate the SWL in kilograms of FSWR square the rope diameter (D) in millimetres (mm) and multiply by 8.

Formula: SWL (kg) = D2(mm) x 8

For example:

Rope dia (D) = 12 mm

SWL(kg) =D2 (mm)x8

= D (mm) x D (mm) x 8

= 12 x 12 x 8

= 1152 kg SWL (t) = 1.15 tonnes

The above equation can be reversed to calculate the diameter (D) in millimetres of FSWR needed to lift a given load. To do this, divide the load (L) in kilograms by 8 and find the square root of the result.

Formula: D(mm) = √L(kg) 8

For example:

Load = 1152 kg

D (mm) = √1152 ÷ 8 = √144

= 12 (mm)

Therefore a FSWR sling of at least 12 mm in diameter is required to lift a 1152 kg load for a straight lift.

safe working load (SWL)

The manufacturer's recommended maximum weight load for a line, rope, crane or any other lifting device orcomponent of a lifting device. The SWL is determined by dividing the minimum breaking strength (MBS) of a component by a safety factor assigned to that type and use of equipment. The safety factor generally ranges from 4 to 6 unless a failure of the equipment could pose a risk to life; in that instance the safety factor would be a 10. For example, if a line has an MBS of 1,000 pounds and a safety factor of 5, then the SWL would be 200 pounds. 1000 / 5 = 200. Also called working load limit (WLL).

Calculating Breaking Strength, Safe Work Load and Weight of Hawserlaid Ropes

## CALCULATION OF APPROXIMATE BREAKING STRENGTH (B.S) AND SAFE WORKING LOAD (S.W.L) FOR MANILA ROPE

Method of finding the Breaking Strength (B.S) is to divide the square of the diameter of the rope in millimetres by 200.

Example of a diameter 24mm Manila Rope:

Breaking strength = diameter² / 200

= $24^2$ / 200

= 576 / 200

= 2.88 tonnes (approx. 3 tonnes)

Safe Working Load (S.W.L)

Method of finding the Safe Working Load (S.W.L) is to divide the Breaking Strength by factor of safety.

The following factors of safety for ropes are used generally:

| | | |
|---|---|---|
| Lifts and hoist | - | 12 |
| Running rigging and slings | - | 8 |
| Other purposes | - | 6 |

Safe Working Load = Breaking Strength / Safety Factor

= 3 tonnes / 6

= 0.5 tonnes

## CALCULATION OF APPROXIMATE BREAKING STRENGTH (B.S) AND SAFE WORKING LOAD (S.W.L) FOR POLYPROPYLENE ROPE

Method of finding the Breaking Strength (B.S) is to divide the square of the diameter of the rope in millimetres by 77 tonnes.

Example of a diameter 24mm Polypropylene Rope:

Breaking strength = diameter² / 77

= $24^2$ / 77

= 576 / 77

= 7.48 tonnes (approx. 7 tonnes)

Method of finding the Safe Working Load (S.W.L) is to divide the Breaking Strength by a safety factor of 6.

Safe Working Load = Breaking Strength / Safety Factor

= 7 tonnes / 6

= 1.18 tonnes( approx. 1 ton)

CALCULATION OF APPROXIMATE BREAKING STRENGTH (B.S) AND SAFE WORKING LOAD (S.W.L) FOR POLYETHYLENE ROPE

Method of finding the Breaking Strength (B.S) is to divide the square of the diameter of the rope in millimetres by 106 tonnes.

Example of a diameter 24mm Polyethylene Rope:

Breaking strength = diameter² / 106

= $24^2$ / 106

= 576 / 106

= 5.43 tonnes (approx. 5 tonnes)

Method of finding the Safe Working Load (S.W.L) is to divide the Breaking Strength by a safety factor of 6.

Safe Working Load = Breaking Strength / Safety Factor

= 5 tonnes / 6

= .83 tonnes

FORMULA TO CALCULATE WEIGHT OF DIFFERENT 3 STRAND ROPES.

220 meter coil of Manila/Sisal - d2 /6.6 kilograms

220 meter coil of Polyamide(Nylon) - d2 /7 kilograms

220 meter coil of Polyester - d2 /5.6 kilograms

220 meter coil of Polyethylene - d2 /9 kilograms

220 meter coil of Polypropylene - d2 /10 kilograms